Effects of the contemporary technological model on the genetic regulation of inner human faculties Updated

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A note on the background of this paper

The following article on the biosocial regulation of human nature was published in the interdisciplinary scientific journal, *Journal of Social and Biological Structures*, in 1980. It contained a new and original theory on the interactions of science and technology, culture, human nature, capitalism etc. Another more comprehensive paper, *Biosocial regulation of human nature by social systems-science and technology-culture complexes,* was written in 1982, in which the original theory and contents were refined and elaborated. The latter paper was not published. These papers and their theory are extremely relevant to the continuing and multiplying dehumanization, injustice, inequality, wars and conflicts, and various other sinister developments on this planet. The priests and high priests of Advanced Capitalist-Imperialist Technocratic Civilization are blindly, demonically, and pathologically obsessed with technocracy and the profits and powers that it creates, through knowledge, information, manipulation, exploitation, and pollution of nature. Even though there is now a great deal of information on the negative and destructive effects of all this on nature, its life supporting systems, and ecology, there is almost none on the human nature and its inner ecology. The inner ecology of human nature has been, and continues to be, disrupted, deformed, and destroyed, the Human Soul-source of the spiritual-emotional parts-being its greatest casualty. Human Reason also underwent extreme reductionisms and is now reduced to capitalist-technological rationality, under the above civilization. This is indeed a most sinister development, as it distorts, perverts, and deforms both the Human Soul and the Human Reason.

In the Advanced Capitalist-Imperialist Technocratic Civilization, the Human Reason is progressively transformed into Capitalist-Technological Rationality, among scientists, technicians, various types of capitalists, politico-economic leaders, and overwhelming majority of the populations. It becomes the dominant faculty in the mass mental apparatus, on the expense of various other human faculties, especially those that are connected with and are expressions of the Human Soul. Fragmented and abstracted from the Human Soul, and compartmentalized, the Capitalist-Technological Rationality increasingly serves and empowers capitalist-imperialist injustice, inequality, exploitation, aggression, domination, brutality, selfishness, big and small lies, hypocrisy, etc.,-in a word, Evil-both on the national

and international levels. On the international level, this is frequently manifested in brutal, atrocious, and unjust imperialist wars and conflicts. The Advanced Capitalist-Technological Rationality becomes increasingly transformed into Sinister Insanity, which is also exported to rest of world.

Capitalism, especially the advanced capitalism, in the form of imperialism, is the greatest eroder, distorter, perverter, and destroyer of Human Soul, the seat of all the higher human qualities and values, which, in mentally and spiritually healthy, unalientated, and unreified humans, integrates and regulates all the diverse faculties, drives, needs, and actions, including those of the Reason and Intellect. Reduction of Reason and Intellect to Capitalist Technological Rationality (CTR) and tailoring and submission of Soul to its requirements-as has been done in the Advanced Capitalist-Imperialist Technocratic Civilization (ACITC)-perverts, disrupts, and destroys the very foundation of the inner ecology of human nature. This is the subjective basis of all the objective evils and injustices, with which the ACITC has saturated and polluted this planet, including the mass psychology and human nature of overwhelming majority of its own populations, as well as much of the rest of mankind. Not surprisingly, the most extreme forms of these phenomena are to be found in the current leader of ACITC, the United States of America, from where these radiate to every corner of the planet. Nothing is left untouched or alone.

Surely, the problems of conditioning and tailoring of human nature also existed in other class-divided systems and societies. However, the particular type of tailoring being described here is unique to the ACITC, which is also the most efficient and most massive, as it is being automatically regulated and implemented by the most powerful, combined, united, and inextricably intertwined politico-economic, social, cultural, mass psychological, and epigenetic forces of capitalism and technocracy.

All the immense material powers-and systems of class-based national and international relations-of ACITC were achieved with the applications of CTR, resulting in the most diabolical association of capitalism, technological rationality, and elements, components, and forces of nature on this planet. These powers were contained with the emergence and development of the Communist Civilization (CC) and its Socialist Technological Rationality (STR) and the development of various powers and products-and systems of national and international relations that were striving to create classless societies-with its applications. CC and STR had the potential to dialectically preserve and further develop the integrity of the inner ecology of human nature and create a radically new human civilization. However, in actual practice, due to existential dangers, constant attacks, threats, conspiracies, and life and death struggle with the ACITC and CTR, this potential could only be partially realized. The extreme hostility and dangers of highly developed technocratic militarism of ACITC did not allow this potential

to develop and manifest itself, as it would have in the absence of these. The CC had to devote large amounts of its resources on countering such mortal dangers.

The greatest setback and blow to the development of a just, good, and humane civilization occurred with the betrayal and destruction of CC and STR in the USSR, Eastern Europe, and China, where capitalism and CTR have been restored. They are now part of ACITC, even though Russia and China have been increasingly forced into the position of opposition and competing blocks within the ACITC, by the US and EU. The current international situation is much more dangerous than that of the cold war, as it is characterized by the inter-capitalist and inter-imperialist struggle and competition for resources, markets, exports, spheres of influence and dominance, everywhere on the planet. The Third World War, in the face of US and NATO aggressions in Afghanistan, Iraq, Yugoslavia, and Libya, was only prevented by the compromise, restraint, and retreat of Russia and China. However, Russia has now been pushed into a corner in the new Ukrainian conflicts on its border, instigated by its rivals in the US and EU. After the overthrow of the elected President, fascists, racists, and extremists-who want to turn Ukraine into a base of NATO against Russia-have gained control of the government machinery in Ukraine. Russia was finally forced to draw a line there and seems to be willing to confront the NATO forces, if necessary. As far as the Chinese are concerned, their role so far has been ambiguous, as they have been benefiting enormously in their trade and investment relations with the West and rest of the world, and have been very reluctant to rock the boat. Capitalist westernization of Chinese political economy, society, education system, and culture is in full swing, in spite of the hypocritical admonitions of its political leaders in this regard. Hundreds of thousands of Chinese students have been sent to the American and European universities. When they return, most will bring back the western capitalist mass psychology, culture, and behavior. It remains to be seen how the Chinese will act, if the push comes to shove. They are also being pushed into a corner and may finally draw a line, like Russia did.

Many of these phenomena and processes are occurring on the mass psychological, cultural, and epigenetic levels.

This article was written long before epigenetics, involving gene regulation, became accepted and popular among the scientific community. The research information has exploded in this area during the previous twenty years and now it is being applied in all areas of biological, medical, and social sciences, various phenomena being reinterpreted in the light of such neo-Lamarckian discoveries and theories. However, no one has yet come up with such a comprehensive and macro-level theory-integrating politico-economic systems, technocracy, culture, and human nature-as contained in these two papers.

It is self-evident that ultimately it is the humans and their evolving nature that are responsible for what is happening. Such research is not only not funded, but is suppressed and gets the researchers blacklisted in the various institutions of the Advanced Capitalist-Imperialist Technocratic Civilization. That is what happened to this author, who funded it from his own meager resources.

The new discoveries prove that the French evolutionary geneticist Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (1 August 1744 – 18 December 1829) was correct in his theory of the inheritance of the acquired characteristics and that various social and physical environmental factors can and do bring about changes in the gene regulation and expression, which can then be inherited and passed on to the progeny. His theory, which was produced long before that of Darwin, was subjected to extremist discrimination, suppression, negligence, and ridicule for more than 200 years-in favor of the exclusivity of Darwinian theory of evolution-, by the scientific and other establishments, in the Western Capitalist Civilization, which inflicted great damages to the development of extremely important research information and knowledge in that area, during all that time. Founders of Marxism-Leninism had used the Darwin's evolutionary theory in support of their theories of historical and dialectical materialism, as it scientifically explained the origin of new and different species from the old, just like the new social systems originated from the old ones. On the other hand, more importantly, the capitalists used its categories of competition, natural selection, and survival of the fittest to explain and justify similar features in their own capitalist system. They resisted and excluded any theories or research that would indicate the role of environmental factors in modifications of traits, their inheritance, and in the evolutionary changes. Only recently, the research discoveries in epigenetics have exploded to such levels that Lamarck's theory can no longer be ignored or denied.

The above papers were written at a time when epigenetics was in its infancy. It remains the only such published work in these areas. The author funded that theoretical work from his own meager resources. In this country, he has suffered diabolical damages to his life and career by the scientific establishments due to multidimensional philosophical, intellectual, political, cultural, and racist discrimination. The above-mentioned biosocial regulation theory needs to be expanded and developed further, in the form of a book. He has all the ideas in his head for doing that and has done updated review of literature. He had already refined and developed the original theory in a second more detailed paper. He needs collaboration and some institutional support for completion of this work. If anyone is interested in that, please contact the author at unpollutedfaz (at) aol.com or by telephone at (602)539-1440. This would be a truly original and groundbreaking work, most important for the identification and comprehension of enormous problems that have developed in the Subjective Factor and Human Nature, under the powerful politico-economic, socio-cultural,

mass psychological, and epigenetic forces of capitalism, imperialism, and technocracy. We are living through one of the worst periods in human history, certainly the worst during the past two centuries. Socialism did not fail in the USSR or China. It is the human nature that failed and betrayed socialism there. Causes of such failure are rooted in the contradictory and dialectical nature of human nature and its interactions with the politico-economic systems, cultures, and technocracy etc. These causes have not been investigated in any depth

Lamarck had arrived at his theory on the basis of Intuition, a faculty that Albert Einstein considered to be of primary importance, much more important than Reason, for discovering really fundamental and important new theories and knowledge. Intuition had enabled Einstein to arrive at the foundations of his theories of relativity.

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Effects of the contemporary technological model on the genetic regulation of inner human faculties

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Some implications of recent advances in the area of gene regulation suggest that the contemporary technological model may be creating a conflict between different inner human faculties on the gene regulatory level by ultra-complex processes of turning on or off the genetic batteries for these faculties. The need for a more holistic model is indicated, in which there need not be a conflict between the expression of genes for abstract analytical reason and will to power on one hand and of those for feelings, intuition and synthetic perception on the other. The deterministic biological view of human nature is refuted, by discussion of the implications of recent gene regulatory theories, from within the field of genetics. The possible role of gene regulation in the hemispheric functions of the human brain is also discussed. It is concluded that the model represses the expression of certain human faculties, e.g. feelings like care and love; passions for goodness, justice, truth, and beauty; intuition and synthetic perception; etc., on the psychogenetic regulatory level. It is suggested that psycho-cultural forces of the model operate through the mediation of chemical substances like hormones on the level of individuals as well as populations.

Introduction

Contradictions inherent in the nature of advanced technological societies have been perceived and described in great detail by several writers in the field of humanities, such as Husserl, Heidegger, Sartre, Marcuse, Horkheimer, Habermas, Huxley, Orwell, Eric Fromm, Rollo May, Roszak etc. However, most of their works remain within the respectable

boundaries of Western rationalism. Hence the basic contradictions remain hidden and untouched, or else are artificially reconciled with the general essences of modern society. These attitudes in the humanities are further reinforced by the culture and personalities created by science and technology and the self-satisfied conformity, activity and productivity of scientists and technicians within the norms of extremely fragmented technological rationality.

Throughout the history of Western philosophy, science and society, the faculty of human reason has been glorified and developed at the expense of human feelings. Progress of the

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The Editors consider this example of socialist analysis of social and biological structures to warrant publication despite technical scientific issues raised by referees.

Some explanatory notes are provided in an appendix.

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former has been concomitant with a proportional regress of the latter. This is the fundamental contradiction and crisis of Western society. This contradiction, most acute and developed in the advanced industrial societies of the West, is by no means restricted to these societies. It is spreading like plague to the so-called developing societies, both in the West and East, due to extension of the technological model and culture of the former societies, which creates the most intensified and climactical crises in the latter.

Recent events in Iran are evidence of the great danger in enhancing this contradiction, without a correct dialectical appraisal of its elements, in relatively holistic cultures over a relatively short period of time. People of Iran have, in fact, fundamentally rejected, besides other things, the extremely fragmented, technologically rationalistic psychological character structure of the West evolved over a relatively long period of history in which, for all practical purposes, there is no place for the conflicting portions of the non-rational. Such crises are to be, hopefully, expected in other societies, as this is the only hope left for combating the rapidly advancing universally triumphant plague of dehumanization, robotization, despiritualization and subjugation of the entire human species under the auspices of the Western technological apparatus. In the history of Eastern civilization, Persia has distinguished itself by producing some of the greatest poets, philosophers and mystics of the

world. It is extremely naïve to expect that this great Persian spirit can be fragmented and confined into the small, rusty, and degenerate shell of abstract and alienated analytical rationality of Western technology. Equally naive is to expect this not to happen if the shell is somehow developed internally rather than extrapolated from the West. This can perhaps be avoided if due consideration is given to the critical theories of advanced industrial societies.

There has been no significantly radical criticism of the technological culture from within the community of scientists. The effort to reduce and investigate only those portions of reality that lend themselves to the established methodology and criteria of natural sciences is the fundamental factor behind this. Some other factors, among several, are an amazingly high degree of integration and conditioning of scientists in the positivistic mold, the most integrated of whom are placed in the strategically important positions by the scientific establishment; financial and prestigial considerations; and support by strictly materialistic and profit- oriented institutions of the society. This is very unfortunate indeed, as they would seem to be the people who could identify and describe the contradictions of this culture most precisely—not so much because of the sharpness of their analytical rationality (as a matter of fact, in spite of it!), but because they internalize the norms of this culture most rigorously and rigidly and therefore would be likely to undergo extreme pressures and conflicts. However, this deficiency will become more understandable later in the course of this paper when a psychobiological hypothesis of the development of the mental apparatus of modern man under the reality principle of contemporary technological society is offered.

In spite of such debilities, some specialized fields of science are producing information that can analogically be utilized to explain certain human phenomena that, although they are easily and directly experienced facts, do not attain the level of scientific data because of the total incapacity of existing scientific methodology to investigate such facts. For example, recent revolutionary discoveries in the areas of gene action and regulation in higher organisms, if integrated and interpreted within the context of the general critical theory of technological society, can give us a glimpse into the nature of some of the biological processes underlying the various psycho-sociologico-philosophical analyses of the general structures of contemporary mental apparatus. This essay represents an attempt to investigate some of the genetico-biological changes taking place as a result of the contemporary technological model with special reference to the inner human faculties.

To start with, the following assumptions are proposed.

(1) Genetic changes are taking place in human populations like they are in every other form of life. Some of the forces behind these changes may be similar, while others may be unique to human beings.

(2) Inner human faculties, e.g. intelligence, intuition, instincts, feelings, desires, ego, will etc., all have the following components:

(a) Genetico-biological.

(b) Cultural. (The component which creates general norms and general psychic structures in human populations. Some general psychic structures have been explicated most thoroughly by Marcuse (1955, 1964) and by Wilhelm Reich.

(c) Consciously chosen. (Potential individual psychic structures which may coincide or conflict with the general psychic structures.) We shall deliberately exclude the use of philosophical theories of consciousness-body and consciousness-material nature relationships in order to address our paper to the community of scientists. We shall also neglect the discussion of extra sensory perception (ESP) (which is necessarily related to the discussion of consciousness) for the same reason. This purely methodological approach is in no way intended to deny the significance of discussions about consciousness. Scientific research results have just started to emerge indicating the specific physiological changes accompanying different states of consciousness (Bloomfield et al., 1975; Davidson, 1976). Tremendous philosophical research has also been done on this subject.

There is interaction between (a), (b) and (c). An analysis of the origins of the cultural norms is beyond the scope of this brief paper.

(3) Individuals within a given population can express these faculties selectively by free choices.

(4) Each of these faculties has several elements which are expressed polymorphically in populations and individuals.

(5) Abstract analytical reason is only one of the various elements of the faculty of intelligence, containing within itself the aforementioned components (a), (b) and (c) of (2).

(6) The faculty of abstract analytic reason is the most important foundation of the contemporary technological rationality and model.

(7) There are two general, distinct categories of genes underlying the relationships of human beings with each other and with nature. These are:

(a) Genes for abstract, calculative, analytical, quantitative faculties.

(b) Genes for synthetic, meditative, dialectical, qualitative faculties.

In present-day societies there is functional overlapping as well as relative functional dominance of one category over the other.

(8) The first category of genes is appropriate for the scientifico-technological understanding of material nature, while the second is more natural for interpersonal and intercultural human relationships. However, this does not mean that these categories in real life are restricted to their natural objects. Cultural transformations of them create a wide array of blending together of the various elements of faculties and objects. In the advanced technological society, elements of reality are predominantly constituted with the first category. Rationality itself is understood and defined in terms of constitutions with the first category.

(9) Natural and human selective forces are active in human populations, selecting for and enhancing the genes for certain faculties while selecting against and diminishing the genes for the conflicting faculties.

Review of the literature

Husserl (1931, 1970), while perceiving the crisis of contemporary Western society, fails to identify and develop the basic contradiction. Instead, in the mode of a rather atypical bourgeois rationalist, he ends up justifying what has been, in spite of all ambiguity in his writings (as a necessary consequence of failing to face up to the basic contradictions), and offering optimistic future prospects to Western Civilization if it could rationally organize a human science of philosophy based upon its own unique methodology and criteria. Although his phenomenology explicates in detail some very deep insights into the nature of the sickness of present-day Western society, it generally floats above the level of the fundamental contradiction. His prescribed cures end up to be all-inclusive universal justifications of natural sciences and projections of infinite possibilities in the realm of human sciences and culture. He does not develop the dialectic of natural sciences and human nature or the conflicts that it creates within the human mental apparatus in any dimension of temporality. This is because of his efforts at universal reconciliation, besides his failure to identify the fundamental contradiction.

Sartre (1976), in his latest major philosophical work, concentrates upon the contradictions between analytical and dialectical rationalities. While the principal domain of dialectical reason is in the social world and within it in the oppressed classes, that of analytical reason is in science and the ruling classes. Sartre does not exclude the possibility that there may be dialectics of nature; but he correctly points out that, if so, this is yet to be discovered and not

merely frameworked into the neutral findings of science. These are very important insights. However, Sartre's philosophy also either essentially ignores the fundamental contradiction or treats it as already surpassed in favor of rationality.

These are the philosophies that logical positivists and philosophers of science label as 'irrational'.

Marcuse's works (1955, 1964), though demonstrating an incredible lucidity and depth of insight into the negative aspects of advanced technological rationality, nevertheless remain essentially embedded in a broader, more holistic rationality. His *One Dimensional Man* remains the best critique of modern fragmented character structure of the advanced industrial societies. His insights into the integrative processes of an all-embracing powerful technological apparatus and the virtual defeat of negating elements of reality, resulting in the triumph of the positive, are especially valuable. In spite of extreme sensitivity and precision of perceptions, Marcuse's works do not accord sufficient and explicit significance to some of the non-rational forces of human personality and society.

Rollo May (1969) and R. D. Laing (1967) quite objectively describe the shrunken, mechanistic, bland character structure of modern man in which Eros has been greatly reduced and weakened. Rollo May posits the possibility that conflict between technology and Eros may be irreconcilable. Erich Fromm (1955) considers the modern society as essentially insane and in need of humanistic psychotherapy. Within the framework of this society, he perceives man as degenerating. He also offers alternatives that generate great optimism. Perhaps the most consistent criticism of this society is encountered in Roszak's works (1969), in which he emphasizes the psycho-sociological importance of non-rational human faculties within the context of a rationalistic society. Many of his arguments effectively refute the exclusive claim of rationalism upon reality.

Sigmund Freud's theory of the dynamics of civilization and human nature (1943, 1949) had already explicated the repressive processes in the human mental apparatus in psychological terms while recognizing and emphasizing the biological dimension of these processes. This emphasis, now labeled 'biologism' by some, has been underestimated by the neo-Freudian schools. Hence, the biological dimension of contradictions and conflicts between reality principle and pleasure principle, in which the latter is subjugated by the former, through society, in the mental apparatus of the individual, has remained unexplored in any significant depth or specificity, although advances in biology and genetics now permit the initial theoretical steps to be taken in this direction.

Another point worth mentioning is that although there is a considerable number of scientific studies on the heritability and expression of intelligence (mostly founded upon the capacities

of abstract analytical reason) in genetics, there are almost none about feelings. This is just one more example of the basic prejudice of the scientific establishment against human feelings.

After this extremely brief review of some of the most profound writers in the humanities, within the context of which it was impossible to represent their ideas in any depth, now we turn our attention to the developments in biological sciences.

Recent advances in the genetico-biological understanding of higher organisms indicate that much of the genome in these is in an inactive state at any given time and that there is far more DNA (deoxyribonucleic acid) present in their genetic material than can be accounted for by the total number of genes needed to code for the proteins. Moreover, multiple repetitive sequences of DNA are known to exist in the higher organisms (Britten & Davidson, 1969). One might indeed wonder about the states of activity and inactivity in different parts of the genome in various tissues, the function of the repetitive sequences of DNA, the factors and forces responsible for the states of activity and inactivity, and the fate of the perpetually inactive and unexpressed portion of the genes. In this essay, we are primarily interested to attempt to explore these phenomena in their interactions with the cultural processes of advanced technological society.

The most important revolutionary models of gene action and regulation, up to this stage, have been proposed by Stein et al. (1975), Britten & Davidson (1969) and O'Malley & Schrader (1976). Stein et al. have presented overwhelming research evidence that the non-histone fraction of the chromosomal proteins is involved in turning on or off the different batteries of genes in the cells, while the histone fraction is responsible for maintenance and stability of the chromatin structure as well as for the non-specific repression of the genetic sequences. Histones are positively charged, alkaline proteins that are similar in different tissues and even in different organisms. In contrast, non-histone proteins are extremely heterogeneous, and a single nucleus may contain more than 500 species of them. There is also considerable variation between different tissues in the content of non-histone proteins. These are, at least partially, in a state of dynamic flux, while histones and DNA are a permanent part of the genome (Stein et al., 1975). It has been demonstrated that specific non-histone proteins are associated with the expression of specific genes. Genes are more actively transcribed in the S phase of the cell cycle than in mitosis. Moreover, non-histone proteins are also relatively more actively phosphorylated in the S phase. Histones are known to bind less tightly to DNA in the S phase than in mitosis. Stein et al. propose that phosphorylation of non-histone proteins, at the time of binding to a histone-repressed segment of the DNA, causes the repelling of negatively-charged DNA (as phosphate groups are negatively charged). At the same time these become strongly associated with the

positively-charged histones. Hence the DNA is freed from the histone repression and becomes activated to transcribe.

In a more recent work, O'Malley & Schrader (1976) have investigated the role played by steroid hormones in the complex gene regulatory system. This type of work is extremely important for the understanding of broader aspects of gene regulation, as several chemically well-defined external agents are known to induce large-scale changes in the activity of genes in the specific target tissues. These include, besides steroid hormones, several vitamins, embryonic inductive agents, polypeptide hormones and several plant hormones. Steroid hormones include male sex hormones (androgens), female sex hormones (estrogens and the progestins) and the corticosteroids. These are small molecules that can easily diffuse into and out of the various types of cells. O'Malley & Schrader presented conclusive evidence that hormonal action takes place on the genetic level. At first the steroid hormones bind to a receptor dimeric protein molecule (consisting of two sub-units A and B, each an independent strand of amino acids) in the cytoplasm. This hormone-receptor complex then enters the nucleus and binds to an acceptor site in the chromatin defined by a specific portion of the AP3 fraction of the non-histone proteins. Only the B subunit of the hormone-receptor complex binds with the acceptor site. The A subunit may then be liberated to interact with DNA. The process of protein synthesis starts with the binding of the enzyme RNA polymerase to the DNA. It is unknown how the interaction of the A subunit or binding of hormone-receptor-acceptor complex triggers the binding of RNA polymerase to specific DNA regions. However, ultrasensitive experimentation (O'Malley & Schrader, 1976) has demonstrated the following:

(1) Initiation of gene transcription involves one hormone-receptor complex per acceptor site.

(2) The degree of stimulation of gene activity as a result of hormone action depends upon the type of target-tissue.

(3) Hormone-receptor complexes stimulate general gene transcription as well as the expression of specific genes coding for specific messenger RNAs.

(4) The A subunit of the receptor dimer interacts directly with the DNA and somehow stimulates the synthesis of messenger RNA.

In another model of gene action and regulation, Britten & Davidson (1969) have shown that large batteries of producer genes can be turned on or off in response to a single initiatory event on the sensory gene level. In this model emphasis has been placed on the regulatory functions within the genetic material. The regulatory fraction consists of sensor genes, integrator genes, producer genes and activator RNA. A set of integrator genes, in response to a specific initiating event occurring at the sensor gene level, causes the concerted activity of a

large number of producer genes which then manifest themselves through various biochemical and phenotypic products. Receptor genes and activator RNA form sequence-specific complexes that coordinate the activities of large batteries of producer genes.

These models of gene regulation are not mutually exclusive. On the contrary, it is possible to interpret them as complementary parts of a much broader system of gene regulation that is immensely complex and is just beginning to unfold. For example, the mechanism of hormone/dimeric receptor/protein molecule and non-histone acceptor site in the chromatin of the O'Malley & Schrader system may be followed by the gene regulatory events of Britten & Davidson's model.

Britten & Davidson had already considered the following factors that provided the basis of the newer models:

(1) The possible role of protein molecules as the initial binding sites for the inductive agents such as hormones.

(2) The role of histones as the general repressors of transcriptive activity of the genes.

(3) The possible role of a non-histone protein in the chromatin as receptor site for an external agent. (They specifically cited the work of Maurer and Chalkey, in which a non-histone protein from the calf endometrial chromatin was shown to bind 17 B-estradiol.)

Unfortunately, Stein et al. and O'Malley & Schrader did not try to integrate the model of Britten & Davidson with their own systems.

The most pioneering applied discoveries in the areas of gene action and regulation have been made by Kerr in his work with bee populations. He observed that genetically- determined queens could become workers in the bee colonies under certain conditions (Kerr & Nielson, 1966). Later he noted that the queens, workers and males in *Melipona quadrifasciata* could result from the same basic genetic constitution. Workers in *Melipona* have ovaries and are females inside, but their external morphological characteristics are almost the same as males (tegument, eyes, wings etc.). Hence, it became clear that it was the gene regulatory mechanism, and not the basic fixed genetic constitution, which was responsible for sex and caste determination in the bee populations.

The aforementioned puzzling phenomena are explained by the processes of turning on or off the different genetic batteries (Kerr, 1974, 1975; Kerr *et al*., 1975). Two sets of genes were reported to be involved at different phases of the life cycle. One set is active in the embryo and is responsible for the ovary or testis, while the other is functional in the prepupal stage regulating the transformation of the imaginal discs and tegument in adult male or female

structures. A juvenile hormone was found to be the decisive factor in sex and caste determination. This hormone is the main product of *corpora allata* cells in the bees; the level of its production is dependent upon the number of cells in the *corpora allata*, which in their turn depend upon the amount of the right type of food. Below a certain threshold, the amount of hormone produced is insufficient to turn on the genes for female characteristics. Gene regulatory processes of Britten & Davidson (1969) were applied ingeniously to show how the different gene batteries were turned on or off to regulate the phenomena of sex and caste.

In other interesting studies, Campos (1975) and Campos *et al*. (1975) discovered that if prepupae of *Melipona quadrifasciata* were painted with sufficient amount of juvenile hormone analog, 100 per cent of the pupae became workers. More recently, transformation of worker larvae of *Melipona*, *Partamona* and *Plebeia* into queen pupae was reported with the topical application of juvenile hormone in the cocoon-spinning phase (personal communication, Department of Genetics, Faculty of Medicine, University of Sao Paulo at Ribeirao Preto, Brazil, December 1977). These reports further substantiate the findings of Kerr.

In recent years major breakthroughs have been reported in the field of endocrinology (Guillemin, 1978; Krieger & Liotta, 1979; Schally, 1978; Yalow, 1978). As Dr. Yalow (1978) pointed out, many of these were made possible by the development of radioimmunoassay techniques that detect and measure extremely small amounts of chemical substances in biological systems. Using enormous numbers of hypothalami and sophisticated biochemical techniques, Guillemin (1978) and Schally (1978) in their Nobel-winning research, reported several peptides of the brain that act as hormone releasing factors by direct action on the pituitary gland. Some of these factors are thyrotropin releasing factor (TRF), luteinizing hormone and follicle stimulating hormone releasing factor (LRF), somatostatin and endorphins. TRF participates in the control of the secretion of thyrotropin and prolactin; LRF in the control of luteinizing hormone and follicle stimulating hormone; somatostatin in inhibiting the secretion of growth hormone (GH), thyrotropin, glucagon, insulin and gastrin; and B-endorphin in the release of GH, prolactin and vasopressin (Guillemin, 1978; Schally, 1978). Primary structures of these peptides have been established and various analogs synthesized. Synthetic TRF and LRF from the porcine and ovine brains and a synthetic replicate of somatostatin were found to be biologically fully active in all species of vertebrates studied, including man (Guillemin, 1978). LRF (designated as LH-RH by Schally) was found to be the main link between the brain and the pituitary gland in the regulation of the reproductive function. It was also discovered in the extrahypothalamic portions of the brain and shown to excite sexual behavior in rats (Schally, 1978). Krieger & Liotta (1979) reported evidence that some of the peptide and protein hormones were synthesized within

the central nervous system and that their regulation may differ from that of their pituitary counterparts. Behavioral responses to intracerebral administration of these indicated physiological similarities with other peptidergic neurotransmitter or neuromodulator substances.

The above discoveries in the endocrinology of the brain are very recent. They have established the foundation for completely new types of biological research on the brain, the possibilities of which could perhaps not even be imagined before. Almost certainly new substances will be discovered, and eventually their possible actions on the genetic level will be investigated. As Guillemin (1978) pointed out, the existence of these substances in the central nervous systems has not been mentioned in any of the classical texts of neuropsychiatry. Further research will undoubtedly reveal their involvement in normal and abnormal mental and behavioral processes. Research findings of Drs. Yalow, Schally and Guillemin will be very important in unraveling the biological aspects of large-scale psycho-biologico-cultural processes and changes on the level of populations as well as individuals.

Some hormones have been linked to different emotional, cognitive, and mood states. These include serotonin, norepinephrine and dopamine (Brady, 1967; Bunney & Murphy, 1973; Heston, 1973; Kety, 1967; Sachar, 1973; Woolley, 1967). Brady (1967) discusses the role of endocrine systems in behavioral interactions as well as the relationship between hormonal activity and more durable states of feelings. He mentions the significance of the discovery in the brain stem of points of articulation between nerve cells and the pituitary-adrenal system. Evidence for the existence of similar central integrative mechanisms involving the gonadal, thyroid and posterior pituitary glands is also pointed out. Krieger and Liotta (1979) reported that administration of adrenocorticotropic hormone analogs affected a variety of behaviors in the rat, such as active and passive avoidance behavior, memory, sexually motivated behavior, reverse learning behavior and approach behavior. Sachar (1973) cited studies in which children afflicted with a depressive illness termed the maternal-deprivation-failure-to-grow syndrome were shown to lack the normal growth hormone response to insulin-induced hypoglycemia. These children, after a period of supportive, affectionate hospital care, began to respond emotionally and to grow again, and the normal growth hormone response returned. It was concluded that psychological factors, created as a result of the absence of affectionate maternal care, somehow inhibited the release of growth hormone. Similar inhibition of growth hormone was reported in some adults with depressive illness. Bunney & Murphy (1973) described several psychiatric and metabolic illnesses that involve activation of a latent process which in some cases may be genetically based. Several behavioral and biochemical changes and the possible role of neurotransmitter amines were reported in these states of activation or switch processes, during which one clinical state changed to another. Heston (1973) pointed out that psychiatric geneticists have, so far, focused too narrowly on

psychopathology, neglecting ecological questions which he considers to be the real subject matter of psychiatric genetics.

Bruce & Ayala (1978) concluded that man is genetically no more different from the great apes than are closely related species in other animal groups from each other. They hypothesized that morphological and behavioral evolution involved primarily changes in gene regulation rather than in structural gene loci. Hence, substantial differences between humans and apes in genetic regulation were anticipated. Lewontin (1972) found that, based on randomly chosen genetic differences, human races and populations were remarkably similar to each other genetically, with the largest part of human variation being accounted for by the differences between individuals.

Genetics, consciousness and environment appear to be far more deeply interrelated, on a biological level, than was ever before thought possible. The role played by gene regulatory processes in the speed and direction of evolution has hardly been touched upon. However, it is highly likely that these processes play increasingly important roles in the events of evolution with increasing levels of the complexity of biological organization.

Some implications of gene regulatory theory for human populations, as related to the contemporary technological model

The general theory of this paper is that there is a repressive universal genetico-biological dimension, along with the repressive universal psychologico-sociologico-cultural dimensions, of the repressive dimension of the contemporary universe of technological rationality. Within the scope of the present paper, it should be pointed out that gene regulatory processes proposed for human beings have been worked out within the framework of the general gene regulation theories and are intended to be viewed as such. However, our discovery of the fundamental role of cultural processes in human gene regulation introduces a completely new dimension to the theory. The specific processes revealed in the descriptions of experimental results with other organisms are not intended to be interpreted in terms of homology. Further research can illuminate the common and different features of these processes in various organisms. The continued dialectic between observations and hypotheses, theory and practice, reason and intuition, and experience and facts may eventually yield some general and universally applicable laws of gene regulation. Some of the factors in gene regulation may be similar and others different in different organisms. Mendel's observations led him to the formation of concepts that, through organized experimentation with peas, provided the foundation for the science of genetics, which later yielded some universally valid and applicable laws. The comprehensive gene regulatory

theory of Britten & Davidson was first presented in 1969. Multi-dimensional potentialities of this and subsequent theories need to be tested and developed in all the various fields of life sciences. This paper seems to be the first theoretical attempt to apply this theory in the critique of the technological society.

The theories of gene action and regulation described above indicate extremely high degrees of flexibility and manipulatability in the genetic systems of higher organisms that increase with increasing levels of organization and complexity. In the gene regulatory model proposed for human populations in this paper, it may not be impossible in the future to identify the nature of hormones or other substances produced in response to cultural norms and their sites of synthesis. Although it is too early to speculate, it is anticipated that, given the specificities of human nature, synthesis of hormones and other substances and the stages of development of these syntheses would be much more flexible in the case of human populations than in the bees described earlier. It would be of crucial importance to investigate the interactions between hormones or other substances and the genetic batteries at different developmental stages in order to know the phases at which these interactions become decisive in turning on or off the gene batteries for different faculties.

What are the implications of these theories for the most complex and highest level of organization, the human species? In the ensuing discussion we shall attempt to indicate the general evolutionary directions towards which the contemporary technological model is leading human populations. Some of the salient features of this model are:

(1) The humans-material nature relationship is introduced and developed as the most fundamental cultural norm.

(2) The essence of this relationship lies in the faculty of abstract analytical reason (or in popular language, intelligence).

(3) Another essential feature of this model is the will to power.

(4) The humans-humans relationship is mediated by the primacy of the above.

(5) This model creates a conflict between the faculty of abstract analytic reason (in close association with the drive for will to power) and some other human faculties, particularly those of feelings (e.g. love; care; passion for truth, goodness, justice, and beauty; etc.), intuition and dialectical reason.

At present we find ourselves in complete darkness in respect to the genetico-biological effects of this model. However, certain external manifestations and observations in the different human populations enable us to discern profound inner differences and changes

taking place as a direct result of the application of this model. Undoubtedly there is an interaction between the cultural norms and genetic systems in human populations. The nature of this interaction is, potentially, dialectic; i.e. as the given cultural norms create the general psychic structures in a given population (thesis), the accumulation of individual psychic structures that may be in conflict with the general psychic structures (antithesis) creates new cultural norms (synthesis). This synthesis becomes a thesis again that creates a new antithesis and hence the cultural processes are capable of evolving progressively. However, in real life the general psychic structures, created by the prevailing cultural norms, are very stable due to the passively internalized cultural consciousness of the society, the tremendous need for conformity and identification with groups, and material conditions of existence as expressed in the class structure of the society at a given historical stage. The contemporary technological model creates the cultural norms of abstract analytical reason and will to power that become the primary psychic structures in given populations. Moreover these specific psychic structures become highly stable. Secondary psychic structures and drives are also created in this process. What are some of the genetico-biological events taking place in the individuals and populations corresponding to these structures? This is the most intriguing question that we will attempt to answer in a generalized manner. As this area of investigation has remained untouched so far, it is not possible to go into in-depth analysis of the general processes that are described.

Briefly and simply, we propose that what is happening in the human populations as a result of the application of the contemporary technological model is this:

As a result of the creation of the aforementioned cultural norms and corresponding psychic structures of abstract analytical reason and will to power, these faculties are activated on the genetico-biological level, i.e. genes for these are turned on through the gene regulatory system. Cultural norms and psychic structures interact with the gene regulatory systems in human beings through the mediation of chemical substances like hormones. Hence, we propose to add cultural forces as one of the most important factors in the gene regulatory processes of human beings. On the other hand, the above-mentioned cultural forces tend to inhibit the expression of genes for the faculties of feelings, intuition, and dialectical reason etc., because these are, in the contemporary technological model, in direct conflict with the faculties of abstract analytical reason and will to power. At best, the former faculties have an extremely limited chance of expression in this model and even then in a distorted way, as these must filter through the latter. Abstract fragmented attitudes and faculties become diametrically opposed to and come in clash with synthetic, holistic attitudes, defeating the latter in every form, on every level, only to bring the individual to literal hell at the end of the process.

This process first takes place directly in the small segments of the population that create and internalize the aforementioned cultural norms, e.g. natural scientists and technicians. However, these cultural norms and psychic structures subsequently diffuse into the over whelming majority of the population, both directly and indirectly. For example, in the businessmen and politicians who deal in the technological products, similar psychic structures are created as in their inventors and producers, the scientists and technicians (not to mention the psychic structuralization and gene regulatory engineering that millions of students go through for years in the educational institutions of today). Human faculties in conflict with the cultural norms of the present-day model are subject to two basic pressures:

(1) The powerful selective forces of the model, selecting for the traits of abstract analytical reason and will to power, which become the primary criteria of fitness, while selecting against the faculties of feelings, intuition and dialectical reason. As selection is a powerful force in changing the gene frequencies, and as evolution and race formation precisely take place due to the changes in gene frequencies, this process would eventually lead to drastic changes in the overall balance of genes for these faculties.

(2) The gene regulatory processes. As, at the higher and more complex levels of biological organization, gene regulatory processes are likely to be playing the predominant role in determining the speed and nature of evolution, the relation of the contemporary technological model to these is of utmost importance. It is highly likely that the pressures unleashed by the model against certain traits may be bringing about evolutionary changes over a relatively short period of time.

What happens to the genes for those faculties that are perpetually turned off or that are only occasionally turned on? Are the gene regulatory changes transmissible? It has been found that heritable alterations of controlling elements can be produced by endogenous environmental factors present during normal plant development in corn (Fowler & Peterson, 1978). The whole phenomenon of paramutation (Brink *et al*., 1968) needs reappraisal in the light of recent advances in gene regulation. Paramutation may be a process of inheritance of gene regulatory changes that may be more common in the higher organisms than is currently recognized. It will be of great significance to uncover the precise processes and mechanisms involved in the transmission of gene regulatory changes.

Can gene regulatory processes-which in general offer a tremendous flexibility and variability to individuals in terms of the possibility of turning on or off the various genetic batteries even in response to a small, single initiating event such as hormonal action-also have a reducing effect on the variability at the levels of populations and generations?

In what parts of the body are the genetic batteries for various faculties regulated? In view of the recent research advances in the location of hemispheric functions in the human brain (Levy, 1974), wouldn't it be possible to correlate the location and regulation of these genetic batteries in the different hemispheres? According to Levy:

The right hemisphere synthesises over space. The left hemisphere analyses over time. The right hemisphere notes visual similarities to the exclusion of conceptual similarities. The left hemisphere does the opposite. The right hemisphere perceives form, the left hemisphere, detail. The right hemisphere codes sensory input in terms of images, the left hemisphere in terms of linguistic descriptions. The right hemisphere lacks a phonological analyser; the left hemisphere lacks a Gestalt synthesiser.

Observational evidence indicates the relative dominance of different hemispheres in different cultures. In the technological cultures, the left hemisphere appears to be overwhelmingly dominant over the right. Discovering the general location of faculties of abstract analytical reason, synthetic dialectical reason, feelings, will to power etc., in the human brain would be a major advance in the understanding of human nature in its dynamic existence and evolution.

The questions posited in this essay are very, very difficult to answer indeed. However, if the wholesomeness of human nature is to be preserved, we must strive to arrive at the answers. If the existing methodology of science is impotent to investigate this dimension of human reality, then perhaps it needs to integrate itself with the broader methodologies (such as dialectical or phenomenological) in order to acquire knowledge about the changes taking place in the most intimate realm of reality: inside humans themselves. Efforts to answer some of these questions may also lead to the identification of underlying forces in the mass psychologies of today's nations that, at the very moment of the greatest technological progress in history, are threatening to annihilate everything by some of the very products of this progress. We are entering an era of dehumanization and robotization unprecedented in history. This has been perceived by many great social visionaries. The present model will inevitably lead to war and destruction between people, fascism, and absurd consumerism in spite of the rhetorical opposition of these from different political quarters, because their basic ingredients become deeply rooted in the very genetico-biological regulatory mechanisms of human beings. How much longer can the scientific community ignore a problem that is shaking the very foundations of human nature?

As the contemporary technological model has been, mainly, the creation of males, it is significant to ask how the psychic structures and corresponding genetico-biological regulatory systems of women have fared in all this. What balancing effects might they have had, and may still have, upon the existence and activation of genetic batteries for the faculties

selected and pressured against by this male-dominated model? So far the men have been able to impose a different set of cultural norms on women in general. However, recently, due to their increased knowledge and awareness, women are breaking through these norms. This was a long-overdue historical necessity. One thing is quite clear at this point: Women will shatter the absolutely unjust and stifling norms imposed upon them, and either they will find recognition and success in the Man's World-on his own terms (they are perfectly capable of that, and it is already beginning to happen)-or both men and women will change themselves to adapt to a single integrative set of fundamental norms that would stimulate the expression of reciprocal categories of genetic batteries in both sexes in regard to their total being-in-the-world. The choice is a crucial one in terms of cost to the population as a whole.

All the observational, logical and gene regulatory evidence indicates that man is, genetically, becoming one-dimensional as a direct consequence of the application of the contemporary technological model. Gene regulatory systems for the faculties of feelings, intuition, synthetic thinking etc., remain turned off while the genetic batteries for abstract analytical reason and will to power are turned on, most of the time, in the majority of the population. These batteries incorporate the genes for secondary traits that are positively correlated with the primary ones. Hence the dehumanization, decadence, alienation and robotization-directly observable, self-evident, and irrefutable facts-may have causes rooted in the gene regulatory mechanisms as affected by the above-mentioned model. It is a gross distortion of facts to blame tragedies like the mass suicide of Guyana on the perversion of a few individuals. It is necessary to place and investigate such tragedies within the context of the culture of advanced technological society, which makes genuine emotional and spiritual gratification of any kind virtually impossible.

It would be of paramount importance to investigate the correlation of gene regulatory processes with the different socio-economico-political matrices as generated by capitalism and socialism. As Lewontin (1968) points out aptly, it is not only that scientific discovery influences the direction and rate of socio-economic change. Social and economic world views also permeate science. He emphasizes the nature of science as a social activity and shows that ruling classes have now consolidated the bourgeois revolution so that the liberal democracy has a vested interest in preserving the fundamental structures of world social order within the framework of which, however, individuals are allowed to find their niches on the basis of relative competitive ability. The evolutionists of the twentieth century, preoccupied with the concepts of dynamic stability and equilibrium, see in their view of evolution 'the best of all possible worlds' (Lewontin, 1968).

There are certain parallels between the progress and consolidation of bourgeois revolution and of scientifico-technological rationality. Capitalistic monopoly of the means of production

by the bourgeois class has its counterpart in the capitalistic monopoly and manipulation of technological rationality in the human mental apparatus by the same class. This class has totally reified human existence and has defined and established all the necessary conditions for it. Abstract technology is indeed the most dangerous and alienating force in society. Within the context of capitalism it combines with and compounds the alienation, inherent in the system, immeasurably. Genuine socialism can overcome many of the problems and conflicts described in this essay. Socialism can simultaneously break the monopoly of capitalistic modes of production and that of capitalistic technological rationality in the depths of the human mind. As the capitalistic mode of production will change into socialistic, the capitalistic fragmented technological rationality will be replaced by more holistic forms of thinking and behavior in which the suppressed and degraded human faculties will be revitalized and reintegrated with a socialistic rationality.

It is of considerable significance in the history of knowledge that integrated approaches to behavior have been started recently involving various areas of biological and political science research. As Schwartz (1976) has pointed out, most political science research in the future may well include somatic variables. He also outlined a general scheme that includes biological components of political behavior. In the above publication, several other researchers also have proposed integrated models on this subject.

Bourgeois philosophers have, in general, tried to present the problems of dehumanization and despiritualization in the advanced capitalistic societies in terms of idealistic contradictions between non-substantial consciousness or spirit and the material category of being. In this essay we have shown that the nature of these problems lies in the contradiction between different categories of materiality and that there is no need to appeal to the supernatural or non-material to explain the sickness in the above-mentioned societies. It is inherent in the nature of capitalistic technological model to create this contradiction, producing self- alienation as well as alienation from others in the society on populational levels. Marxism provides the only real method to resolve this contradiction by overcoming the internal conflicts between various material human faculties along with the resolution of external societal contradictions. Negligence of this inner contradiction by the contemporary Marxist theoreticians in favor of total scientization of reality, in the mode of capitalistic science, would be a grave mistake. Marxism should rather insist upon the existence and resolution of this contradiction. Identification of the elements of this psychobiological contradiction of human faculties constitutes a consistent part of the general processes of dialectical materialism.

The essences of political and cultural processes play fundamental roles in the regulation of inner human faculties as well as in determining their form. The problem of form is

inseparable from that of consciousness and understanding, as it is in this unity that various given biological tendencies are integrated and realized. Tackling this problem objectively is crucial for the success of developmental efforts of the less developed societies. Given the contemporary international political reality, they need to enhance the components of abstract analytical reason and will to power in the essences of their cultural norms while taking utmost care not to follow the capitalistic technological road to development by fragmentation and isolation of different faculties and norms. Integration and unified gestalt expression of different faculties, in general, is accomplished in the advanced capitalist-imperialist societies through abstract analytical reason, in the spiritual and emotional societies through different types of feelings, and in the socialist societies through dialectical rationality. It is only through the last faculty that various contradictions between the different faculties can be resolved and raised to ever higher levels while maintaining their existence in their dialectical unity. The problem is that of preservation of the holistic nature of the essence of cultural norms that manifest themselves in gestalt forms. Within these gestalts, the components can be intensified differentially. It should be emphasized, however, that creation and institution of holistic politico-cultural norms is no simple matter. It is only possible as part of the socialist revolutionary process. It is unimaginable that such radical transformations can occur within the present socio-economico-political frameworks. In the meantime, explication of the fundamental problems of the present-day societies would help in correctly identifying them and in carrying out remedial changes at the appropriate stages of the socialist revolutions.

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Appendix

Rational. This term is used in the essay, in general, in the sense which is predominant in the advanced technological society, i.e. rationality reduced to technological rationality based upon the capacities of abstract analytical reason.

Cultural. This is used in a very broad sense and includes, in its foundations, the factors of material, political, economic, intellectual and interpersonal activities, among others.

Categories of genes discussed on pages 3 and 4: These categories become differentially regulated as a result of the complex interactions between the given cultural and gene regulatory processes. Integrated expression of the individual components of these categories also results from these interactions. We have treated spiritual-emotional faculties as part of category (b) here. Category (b) is also naturally oriented towards the synthetic formations of totalities involving various combinations of different elements of reality.